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UPNA STUDENTS AND THEIR WILLINGNESS TO PAY FOR THE USE OF RENEWABLE ENERGIES

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ABSTRACT

This paper presents the results of a survey in the Public University of Navarra (UPNA) in 2016 focused on the perceptions, attitudes and commitment of the issue of global warming and the use of energy from renewable sources to mitigate Climate Change. Within the overall goal, in this paper it is analysed the willingness to pay (WTP) a fee for the use of parking spaces on campus, using the contingent valuation method (CVM) and the relation between the different variables using the Correspondence Analysis (CA). Over 45% of the respondents participating in the market would be willing to contribute additional payment to increase renewable sources.

KEYWORDS

APERNA association

Renewable Energy Sources (RES)

Survey

Contingent valuation method (CVM)

Correspondence Analysis (CA)

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1- INTRODUCTION

This paper begins with a survey that is designed, and implemented on a representative sample of UPNA students to assess their level of knowledge about renewable energy and through the contingent valuation method (CVM), their willingness to pay for different services in UPNA. The survey collects different scenarios; this paper summarizes the analysis on the introduction of a fee for the use of parking spaces on campus.

2- CONTEXT

The International Energy Agency (IEA) is an international organization created by the Organisation for Economic Co-operation and Development (OECD) which was established in November 1974 after the oil crisis.

The primary mandate of this Agency is to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond.

Countries prepare themselves for the critically important UN climate summit in Paris (also known as COP21). COP21 is the 2015 United Nations Climate Change Conference, which was held in Paris, France, from 30 November to 12 December 2015. It was the 21st yearly session of the Conference of the Parties (COP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and the 11th session of the Meeting of the Parties to the 1997 Kyoto Protocol. The conference deals with a global agreement on the reduction of climate change, moreover they decided to move towards a lower-carbon and more efficient energy system.

In places where they want to replace coal-intensive fuels by other kind of energies, like renewable energies. Natural gas is a good fit for a gradually decarbonising energy system, a consumption increase of almost 50% makes it the fastest-growing of the fossil fuels. It is the second more expensive of all the non-renewable energies.

Renewable energy has contributed to almost half of the world's new power generation capacity in 2014. During the last years, there has been an increase in the lower-carbon fuels and technologies in many countries. Among the fossil fuels, natural gas (the least-carbon intensive) is the only one that sees its share rising.

By 2040, renewable-based generation will reach a share of 50% in the European Union, around 30% in China and Japan, and above 25% in the United States and India. By contrast, coal accounts for less than 15% of electricity supply outside of Asia.

China is the world's largest producer and consumer of coal. Total energy demand in China in 2040 will be almost double than the demand of the United States. Nowadays, the energy used in China is subject to mandatory efficiency standards, and continues to improve in efficiency. To conclude, around 2030, the CO2 emissions of China are going to decrease.

One-sixth of the world's population lives in India, and it is the third-largest economy of the world. This country has a huge problem with their lack of access to electricity. In order to meet India's energy needs, it is required a huge commitment of capital and vigilance as to the implications for energy security and the environment. India is the second-largest coal producer in the world, and the largest coal importer, overtaking Japan, the EU and China. Oil production is under the growth in demand, pushing oil import dependence above 90% by 2040. A faster pace is essential to reach the 2030 goal of universal energy access.

Nowadays, 17% of the global population lives without electricity. One of the main goals is to achieve universal access to energy by 2030.

Energy use worldwide is set to grow by one-third to 2040 in our central scenario. Mainly in the countries of India, China, Africa, Middle East and Southeast Asia. However, there are many countries in the world which are going to decrease their use of energy. These countries are located in the European Union, which is going to decrease in 15%, Japan, which is going to decrease in 12% and United States, which is going to decrease in 3%.

The policy preferences for lower coal energy options and more renewable energies are reinforced by trends in costs. On the last 5 years, the costs of all these non-renewable energies have increased, and the price of the renewable energies has decreased a lot. Coal plants of carbon costs 30USD/tonne, which is the most expensive of all the non-renewable

energies. Oil and coal are gradually becoming more expensive to extract while the costs of renewable and of more efficient end-use technologies are falling.

In conclusion, the framework for climate action agreed at COP21 needs to provide a procedure which will secure progressively stronger climate commitments over time if the world is to keep to an emission trajectory consistent with the 2 °C goal. A clear and credible vision of long-term decarbonisation is vital to provide the right signals for investment and to allow a low-carbon, high-efficiency energy sector to be at the core of international efforts to combat climate change. To encourage this transition to a decarbonised energy system, the EU adopted climate and energy targets for 2020 and 2030 with a long-term goal to reduce the EU greenhouse gas emissions by 80–95 % below 1990 levels by 2050.

Along the last years, we have seen some improvements in the amount of renewable energy used in Europe. It was 14.3% of the total in 2012, one year later, it increased to 15.0% in 2013, and to 15.2% in 2014. Europe has actively adopted climate mitigation policies and has improved overall energy security.

The main targets and objectives respecting to renewable energies can been seen in the annexed 2, and have been set for each Member State. This objectives talk mainly about 20% binding of the EU renewable energy target, a domestic reduction of 40% in GHG emissions compared with 1990 levels, a binding share of minimum 27% of GFEC, and a minimum of 27% improvement in energy efficiency.[1]

In order to combat climate change, there are a lot of measures that must be taken into account. [2]The first measure involves the international institutions, like the Kyoto Protocol, the first global agreement to combat this problem. The second one is about the countries. In order to combat this problem, countries must avoid energy waste, replace private transport by another public one, stop deforestation and regenerate forests and other things. The third measure has to do with consumers, there are different actions which have to be applied in their daily live to combat climate change. These actions are mainly using low consumption light bulbs, turning off the TV and the PC when you are not using it instead of keeping them on standby, using other means of transport like the bicycle, the public

[1] All the information was taken from this three sources of information International Environmental Agency (IEA), European Environmental Agency (EEA) and Instituto para la Diversificación y Ahorro de la energía (IDEA)

[2] http://www.eleconomista.es/economia/noticias/160278/02/07/Diez-cosas-que-puedes-hacer-para-frenar-el-cambio-climatico.html and http://www.sostenibilidad.com/6-acciones-contra-cambio-climatico

transport, or sharing car, recycling the packaging, paper, cardboard and organic, trying to use less hot water, monitoring appliances, adjusting the thermostat and planting a tree.

The last measure, which is related to final consumers, is not really taken into account into our daily lives. There is a need to concern people that they must take care of the environment and be conscious with the climate change.[3]

When that need was founded, during the II Energy Week at the Public University of Navarra (UPNA) organized by the Department of Renewable Energy of this university. One of the guest speakers was Klaus Kuhnke, Professor of Renewable Energies at the University of Osnabrück. During the Klaus talk, a group of students and professors from UPNA arose with the aim of creating an association to sensitize to the university community and to the people of Navarre about the situation of renewable energy. Alberto, one student from engineering which took part of the of the II Energy Week decided few weeks later to create a blog with the aim of being a communication tool between all the people who are launching the association. He decided to create a blog as the communication tool because it is easy to use and everybody knows it.[4]

3- DESCRIPTION OF APERNA

APERNA is an association to promote the renewable energies in Navarra; it was founded in May of 2015 by 21 people, 12 students of UPNA University, 8 teachers from the same University and 1 person from outside the University.

When, one year ago, it was created. This association was created as a student association, so the Board of Directors was all composed by students from the UPNA University. The president was Alberto Berrueta, and other students were Javier Samanes, David Velasco, Paula Pérez, Julio Pascual, Víctor Erice and Gorka Puerta.

Nowadays, the technical committee is composed by many teachers from UPNA from different departments. From the department of Electrical and Electronic Engineering they are Alfredo Ursúa Rubio, Andoni Urtasun Erburu, Idoia San Martín Biurrun and Pablo Sanchis Gúrpide. From the department of Mechanical Engineering, Energetics and Materials they are David Astrain Ulibarrena and Gurutze Pérez Artieda. And from the

[3] http://www.ecoticias.com/co2/32530/noticias-medio-ambiente-medioambiente-medioambiental-ambiental-definicion-contaminacion-cambio-climatico-calentamiento-global-ecologia-ecosistema-impacto-politica-gestion-legislacion-educacion-responsabilidad-tecnico-sostenible-obama-greenpeace-co2-naciones-unidas-ingenieria-salud-Kioto-Copenhague-Mexico

4 The official blog page of APERNA association is the following: http://upnarenovable.blogspot.com.es/

department of Statistics and Operations Research they are Javier Faulín Fajardo and Fermín Mallor Giménez.

APERNA has performed many activities during their first year of life. Most of them inside the Public University of Navarra (UPNA) such as TFG contest, training lectures to different groups in the University and in different schools, trip to Electricity Control Centre Red Electrica and Talgo, and the electric mobility day, celebrated the 28th of April.[5] Another activity that APERNA association has started during this course is to give talks about renewable energies to the students in UPNA University.[6] The main aim about these talks is to aware students about the benefits of using renewable energy sources. Moreover, APERNA wants to teach students the importance of increasing the share of solar, wind, geothermal, biomass, and other renewable energy in the mix of total energy.

However, the association has founded a need on this activity, it is to know the target audience of these talks. The solution of this gap would be creating a survey and pass it through all the students in the University. The following project developed on this paper would be solving this need by the proposed method of the survey.

4- PROJECT

This project is based on the survey that APERNA wants to perform. This paper summarizes all the process of the development of the survey, the results obtained and the conclusions and recommendations for the association.

4.1 How we started this project

This project was proposed by APERNA to the students and teachers of the Faculty of Economics and Business on UPNA University. Three students from Economics Faculty, together with some professors from different faculties, agree to make this investigation. It was decided to present this project as the final project of the degree in Economics Faculty.

[5] http://www.unavarra.es/actualidad/noticias?contentId=220830

6 http://www.noticiasdenavarra.com/2015/12/15/sociedad/navarra/la-asociacion-estudiantil-aperna-despide-el-ano-con-varias-charlas-sobre-energias-renovables-y-un-concurso-de-posteres and https://www.unavarra.es/catedra-energias-renovables/tablon-de-anuncios?contentId=213198

4.2 Steps in the creation of this project

When it is required to perform a market research, some steps must be followed in the process.[7]

4.2.1. Determination of the need for research

The first step of this research is to identify the needs which deal with the creation of this survey. There exists a need from APERNA to know whether students from UPNA University would be interested in participating on training courses on renewable energy or not. If they are interested on it, APERNA also needs to know who will be their main listeners of these talks to explain everything according to the audience, and how many listeners there would be on these talks.

4.2.2. Establish research objectives.

APERNA's objectives of this research are several. First of all, to know the grade of knowledgement that students have about renewable energy, and the perceptions that these students have about renewable energies. Secondly, to know how much they are interested on it. And finally, to know their real attitudes and commitment, to know if they really care about the issue of global warming and the use of energy from renewable sources to mitigate Climate Change or not.

4.2.3. Identify the information to be collected

With this survey, APERNA wants to discover and collect much information about students from UPNA. First of all, to know which problems concern the students. On the second position, the perception that students have about the causes, consequences and measures of the climate change. On the third place, the knowledge that students have about renewable energies. On the fourth place, the willingness to pay those students has for the use of renewable energies. Then, their behaviour in real life, in order to compare their real behaviour with what they said, and finally, the personal information about the students, their family and their habits in life.

[7] More information about this steps to follow in order to start the market research can be founded on this webpages, http://www.crecenegocios.com/como-hacer-una-investigacion-de-mercados/ and http://instituto-datakey.blogspot.com.es/2010/09/7-pasos-para-llevar-cabo-una.html

4.2.4. Determine sources of information

Once all the information that it is going to be collected is determined, it is time to decide the sources of information which are going to be used in order to analyse the target audience, which are the students from UPNA University.

The sources which are going to be widely used are primary sources.[8] Primary sources of information are also called original sources or evidence. These sources are called like that because they are artefacts, documents or recording which are created at the same time under the study. The best idea is to ask directly to all the students from UPNA University the questions that we would like to known. It has been created an online survey by Miaulario, the complete survey is accessible in annexed1. Miaulario is a virtual page where students can get information from all your courses and they can download all the notes from all the subjects. The survey has been passed through Miaulario to the students and all the results have been obtained directly on an excel page.

In order to pass the survey through Miaulario the process which has been performed is the following; first of all, to contact with teachers on different subjects. Then, ask if they could pass the survey through the students into one of their computers classes. If they answered yes, ask them the NIA of all their students in class and get them into the survey in Miaulario, going to that computer class and explain to the respondents how to enter into the survey and finally wait for the answers.

4.2.5. Select and develop techniques for collecting information

To gather the information needed for the study, it was decided to create a survey, which is going to be conducted on a representative sample of the target audience.

The techniques which we are going to use in order to explain all the results obtained from the survey can be divided into three levels. The first level is the descriptive one, also called the plain one. On that one we are going to analyse the basic results of all the asked questions, with all the graphs and the sum of all the different answers. This one is the more interesting one for APERNA association. The second level is about less trivial questions. This level consists on analysis of two or three variables at the same time. This level will give answers to the dependence between variables, and the correlation that they have between each other. In order to analyse this level, it is going to be used the method of Correspondence Analysis (CA). And finally, the third level. This level is the more specific

[8] More information about primary sources of information can be founded on this link: https://en.wikipedia.org/wiki/Primary_source

one. This will be based on more interesting questions and is the one which is going to be analysed by using the Contingent Valuation Method (CVM).

With the first level of analysis it will be obtained an average student profile from UPNA University. This profile will be obtained by the answers which have been more times clicked by the students when they were answering to this survey.

In order to collect and analyse information of the second level, the Correspondence Analysis (CA) method is going to be used. Correspondence Analysis is a multivariate statistical technique proposed by Hirschfeld and later developed by Jean-Paul Benzécri. It is a descriptive technique designed to analyse two-way tables containing some measure of correspondence between the rows and columns. The results provide information which is similar to principal components analysis, a method which was studied in marketing research course in the degree of Business Administration. However, it is applied to categorical data, rather than to continuous data. It provides means to display and summarize information in two dimensional graphical forms. The method treats rows and columns equivalently.

The information in the third level will be collected and analysed by using the Contingent Valuation Method (CVM). The Contingent Valuation Method is used in order to find out the valuation that people grant to a determined resource asking to them directly. This method consists on creating a hypothetical market for the research.

The main aim of this survey is that the interviewed person it's found on a situation really similar to a real market, buy or not some quantity of a determined good or service, at a determined given price. This is a hypothetical market, and generally, people don't have to pay the disclosed quantity. The supply of this project is the interviewer, and the demand of this project is the interviewed person.

The main goal of this method is to find out, through a direct question, how people value the change that takes place in their level of wellness when the supply conditions of a good or a service is modified. It aims to estimate the maximum willingness to pay of an individual for the provision or improvement of an environmental good or, alternatively, the minimum compensation required for the loss or decreased enjoyment of an environmental good.[9]

This work focuses on the value of using more environmentally friendly forms of energy, and their valuation in economic terms, through the application of the CVM. The core of

9 More information about the Contingent Valuation Method can be founded on this link: http://www.uv.es/~ssaz/Valoracion_Contingente.pdf

the method is to try to define the economic contribution a person is willing to offer in order to maintain an environmental good (willingness-to-pay or WTP) through suitable payment schedules and options, Riera et al (2005) and Perman et al (2011).

Some of the questions include our survey questionnaire are:

Would you be willing to take a fee for use of the parking for the University to undertake this project? What rate would you be willing to pay per day for the use of parking to finance this project? How do you think is overall energy consumption of today's society?

In relation to the society in which they live, how would you rate the energy that you consume? What means of transport used most often to come to college? Would you be interested in participating in a training course on renewable energy?

4.2.6. Collect information

Once the techniques for collecting information have been developed, it is time to use the survey and start collecting the information.

On this moment, it is time to appoint personnel to make the target audience surveys, and to make it effective. In order to choose this target audience it is going to be performed the stratified random sampling method[10], on this method strata are the degrees studied in the UPNA along with the level in each degree with proportional assignation to each strata.

The goal of a representative sample from a survey is 1000 people. This sample is chosen in order to guarantee a maximum error of 3% in the estimation of proportions, because most of the variables are binary. However, there is a small population size in UPNA University, the small population size, 6836 students11, it was thought that 1000 students is an excessive number of students.

It was decided to take a sample which represents a 10% of the total population, around 683 students. This indicates that the sample errors could be benefited from the smallest values because of the sampling formulas in small populations.

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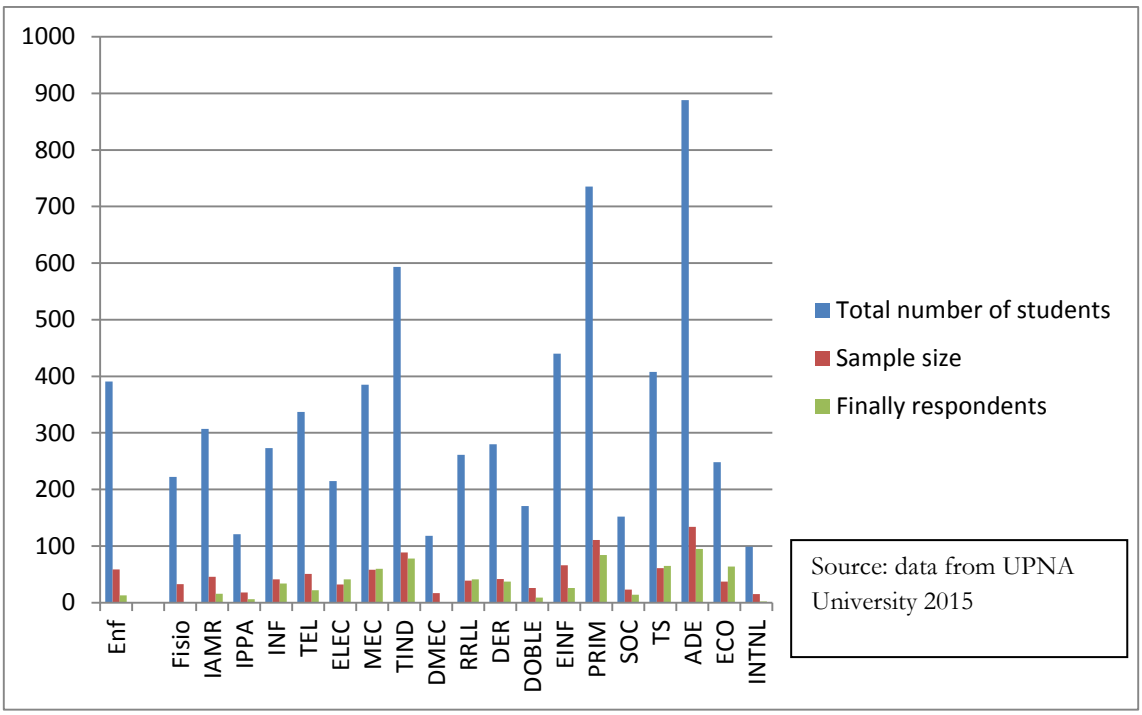
[10] Stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. In stratified random sampling, the strata are formed based on member shared attributes or characteristics. A random sample from each stratum is taken in a number proportional to the stratum's size when compared to the population. These subsets of the strata are then pooled to form a random sample.

11 All the information about the number of students in UPNA University can be founded on UPNA webpage, on the following link: http://www.unavarra.es/conocerlauniversidad/datos-basicos

There is a table and created using the stratified random sampling in order to see to how many students from each degree and course have to answer to the survey, which can be seen in annexed3.

Graph 1: ALL THE GRADES



4.2.7. Analyse information

Once the information has been collected through the surveys, all the data are exported into an excel file, it was analysed and the following conclusions were obtained.

The number of surveys which have been answered during these months has been a total of 707. This amount is higher than the 10% of the total students in UPNA University.

PROBLEMS THAT CONCERN STUDENTS

The students from UPNA University are most interested in the topics of education, unemployment and health. Almost 72% of the students from UPNA University that answered this survey are interested in education, 50% in unemployment, 47% in health and only 25% of the respondents are interested in environment. This information is showed in a summarized table on annexed4.

The topic which more worries to the students of the Public University of Navarra is the climate change. Almost 65% of the respondents are worried about it; this result is really different to the result of how many people are worried about overfishing. Only 4% of the

students are worried about this problem. This information is showed in a summarized table on annexed5.

THE PERCEPTION THAT STUDENTS HAVE ABOUT THE CAUSES, CONSEQUENCES AND MEASURES OF THE CLIMATE CHANGE

Analysing the question about the causes which influence the climate change it can be said that UPNA students that answered this survey believe that the major cause of the climate change is the deterioration of the ozone layer, and the minor cause of the climate change is the exploitation of livestock and farms. Other causes of the emergence of climate change are the burning of fossil fuels in industrial processes, the forest clearing and the burning of fossil fuels in transport and heating. Most of the respondents of this survey are situated in number 3 out of 5 on the statement which says that the cause of the climate change are the natural cycles of warming and cooling of the earth, which means, that people really don't know if the climate change emergence depends on the natural cycles of warming and cooling of the earth or not. This information is showed in a summarized table on annexed6.

Most of the students that answered to this survey believe that looking at the consequences of the climate change, there is a huge probability that the climate change will originate the increase of extreme weather events such as heat waves, floods and extreme droughts. Moreover, they think that the less possible effect of the climate change is that it will cause the migration of the population. This information is showed in a summarized table on annexed7.

Paying attention to the measures to combat the climate change, there is a general believe between the UPNA students that answered to this survey that the most effective measure to combat it is to promote the use of renewable energies. And the less effective measure to combat it is the international agreements such as the Kyoto Protocol or the Paris Agreement. Other measures which could be implemented in order to combat the climate change are the individual performances such as recycling, using public transport or insulate homes and promote the reduction of energy consumption. This information is showed in a summarized table on annexed8.

It is time to analyse the arguments to support the development of renewable energy and the arguments against the development of renewable energy. UPNA students that answered the survey believe that the most important argument to support the development of renewable energy is that it does not generate air pollution. Moreover, they believe that the second better argument to support the development and use of renewable energy is

that renewable energies promote employment, investment in R&D and development of new economic sectors. On the third position to support the development and use of renewable energy it is situated the argument which says that fossil fuels are running out and renewable energy are an alternative. On the fourth position, renewable energies reduce the energy dependence of nations. And, on the last position, renewable energies reduce the variability of energy prices. It has to be said that the fifth arguments have been evaluated on an average higher than 3,5 out of 5 points, which means that all the arguments have been considered important in order to support the development of renewable energies. The respondents said that the most relevant argument to support the use of renewable energies, with 39, 04% of the votes, is that renewable energy does not generate air pollution. However, they also said that the less relevant argument to support the use of renewable energy is, with 2, 04% of the votes, that renewable energies reduce the variability of energy prices. This information is showed in tables 7 and 8 on annexed9.

The most important argument against the development of renewable energies, with an average value of importance of 3.2 out of 5 points is that renewable energies do not guarantee a continuous and adequate supply of energy. There are two more arguments with an average value really similar to that one, which are that renewable energy is not safe for the environment (photovoltaic waste, landscape modification, alteration of ecosystems) and that renewable energies are not profitable if they are not subsidized. Students from UPNA University that answered this survey believe that there are two arguments which are not important at all in order to be against the development of renewable energy. These two arguments are that the implementation of large-scale renewable energy needs a lot of area of land that may not engage in other activities and that nuclear energy is an alternative to renewable energy. The respondents said that the most relevant argument against the development of renewable energy, with 30, 41% of the votes, is that renewable energies do not guarantee a continuous and adequate supply of energy. However, they also said that the less relevant argument against the development of renewable energy is, with 12, 59% of the votes, that implementation of large-scale renewable energy needs a lot of area of land that may not engage in other activities. This information is showed in tables 9 and 10 on annexed10.

THE KNOWLEDGE THAT STUDENTS HAVE ABOUT RENEWABLE ENERGIES

The 55% of the students in UPNA University that answered this survey believe that the general consumption of energy in the actual society is excessive. Moreover, the 96% of them believe that the general consumption of the energy in the actual society is between

excessive and high. However, when it was asked that in relation to the society in which they live, how would they rate the energy that they consume, the 70% of the respondents answered that they are on the average. This means that almost all the people believe that we are over consuming, however, everyone is consuming a high quantity of energy and they are not doing anything in order to change it. Paying attention to the rest of the people, the other 30% which didn't say that they consume the same amount of energy as the average, 15% answered that they consume below the average and 14% said above the average. The other 1% answered that they consume well below the average and very above the average. This information is showed in tables 11 and 12 on annexed11.

On the questions prepared to know how much students know about renewable energies, the results said that 98% of the students know that oil is a non-renewable energy, 87, 55% of the students know that nuclear energy is a non-renewable energy. The best known energy is the wind energy, 98, 6% of the students from the Public University of Navarra that answered this survey knows that wind energy is a renewable energy. This could be caused because in Navarra there is a huge quantity of wind energy, so it is the best known energy in the province. There can be observed also really good results when it was asked about solar energy, 97, 8% of the respondents know that solar energy is a renewable energy. There are not those good results when it was asked about geothermal, only 89% of the respondents know that geothermal energy is a renewable energy. The worst results about the knowledgement of renewable energies is when it was asked about firewood energy, only 22% of the respondents know that this energy is a renewable one. This result was really expected, because in our daily lives in Pamplona it is not really heard that firewood energy is a renewable one. This information is summarized on table 13 in annexed 12.

The next question continues asking about the knowledge that people have about renewable energies, it was asked the following question, what percentage of the energy consumed worldwide is nuclear? The correct answer is 5%, and only the 10, 6% of the students from UPNA University that answered this questionnaire clicked the correct option. The 44, 55% of the respondents believe that the 20% of energy consumed worldwide is nuclear. The 34, 5% of the respondents believe that 50% of the energy consumed worldwide is nuclear, and the 10,3% of the respondents think that 98% of the energy consumed worldwide is nuclear. With these results it can be said that there is a huge ignorance about nuclear energy in the environment of the Public University of Navarra. This information is summarized on a table in annexed 13.

The next question was the following, of the electricity produced in Navarra in 2014, what percentage generated the wind farms? The correct answer is 50%, and only 32, 4% of the respondents matched the correct answer. The majority of the respondents (51%) believe that 20% of the energy produced in Navarra in 2004 was generated by the wind farms. Only the 2, 5% of the respondents think that 98% of the energy produced in Navarra in 2004 was generated by the wind farms. The conclusion obtained with this question is that 67.6% of the students that answered this questionnaire don't know how much of the energy produced in Navarra is generated due to the wind farms. This information is summarized on a table in annexed 14.

The last question from the ones prepared in order to know how much students from UPNA University know about renewable energies was the following, what percentage of electricity consumption of a household is spent due to the appliances in stand-by? The correct answer is 6, 66%. However, it was not included on the multiple choice answers. The possible answers were 1%, 5%, 10% and 20%. The answers which are considered correct are 5% and 10%. The 26% of the students which answered the questionnaire think that the 5% of the energy consumed at home is due to the stand-by, and the 42, 7% of the respondents answered the 10%. This results show that almost the 70% of the respondents answered correctly. From the rest of the students, the 30% of them, it can be seen that they answered wrongly. Moreover, they are separated into two different branches. On the one hand, the 7% believe that 1% of the energy consumed is due to the stand-by. On the other hand, the 23% of the respondents believe that 20% of the energy consumed is due to the stand-by. This information is summarized on a table in annexed 15.

THEIR BEHAVIOUR IN REAL LIFE

It is time to analyse the questions which asks the respondents about their behaviour in real life, in order to compare their real behaviour with what they said on the questionnaire.

The first question is the following, if you were given 1000 Euros to invest in one of these options, which one would you choose? The most voted answer, with 37, 34% of the votes, is the one which says, promote the use of renewable energy. It is thought that this answer could be influenced by the questions which were asked during the questionnaire before. These questions could introduce the respondents into the importance of the renewable energy, which could make the respondent to think that the analyser of the questionnaire would be willing to read that most of the people are interested in renewable energies, so, unwittingly, they mark this option. On the second position, the 16, 12% of the respondents would choose to invest the 1000 Euros in buying containers to facilitate the separation of

waste in the college. On the third position, the 15, 7% of the respondents would choose to invest this 1000 Euros in buying microwave ovens for student use. This answer brings to light that there is a short of supply on these microwave ovens, which are not really expensive, so it could be proposed to the University to buy some microwave ovens. On the fourth position, the 13, 44% of the respondents would invest this money in promoting youth associations. Then, the 10% would invest it on better computers for UPNA University. And only the 7, 36% would invest it on increasing the number of manuals in the library. This last answer seems that the students from UPNA University which answered this survey are not really interested in borrowing manuals from the library, of maybe there is an excess supply of them. This information is summarized on a table in annexed 16.

Although 65% of the students from UPNA University which answered the questionnaire are worried about the climate change, the 32% of the overall students which answered the questionnaire use the car as the mean of transport to go to the college, the 28% of the respondents go to the University by walking. The public transport is a mean of transport really used by the students in order to go to the university; the 25% of the students go to the University by villavesa. The bicycle is a mean of transport which is becoming more used with the time, the 7, 5% of the University students come every day to the university by bike. This year's, it is becoming popular the car sharing in order to come to the University. Since two years ago, the Public University of Navarra, created an online site called Bla Bla Car UPNA. This site is really similar to the webpage Bla Bla Car, commonly used in Spain and Europe. They adopted this name in order to facilitate the drivers who travel from different villages of Navarra to the University every day, to try to find some passengers and share the car and the costs of the oil, in order to make it cheaper for both passengers and better for the environment. The 6, 5% of the students use this mean of transport. There are a small percentage of the University students, the 1% of them, who go to the university by motorcycle. This information is summarized on a table in annexed 17.

Another question which really reflects the behaviour of the people in their daily lives is the following; do you worry about shutting down the standby electronics in your home? Only the 18, 25% of the respondents answered that always. The 53, 18% of the respondents answered sometimes, and the 28, 57% of them answered never. This answers reflect that people is not as worried with the climate change as they used to say on the first questions of the questionnaire.

The last question created to know if the actions of the people match with what they said before if the following, do you worry about turning off the lights of your home when moving from one room to another? On these questions, we have more favourable answers than in the one above. The 77% answered that always, the 22% answered that sometimes, and only the 1% of the respondents said never. This information is summarized in tables 19 and 20 on annexed18.

PERSONAL INFORMATION

It is time to analyse the personal information of the respondents in order to use it for future analysis on the paper.

Almost half of the people who answered the survey were female, and half of them male. This is really good news for the analysers because the answers will be much homogenised. The 51, 2% of the respondents were females, and the 48, 8% of the respondents were males. The average age of the respondents is 20, 8 years old.

It was expected to make the questionnaire to 683 students, around the 10% of all the students in UPNA University. However, these expectations were surpassed and 707 students answered to the questionnaire. The respondents divided by degrees are, 64 students from Economics Degree, 95 students from Business Administration Degree, 2 students from the International Degree in Business Administration, 9 students from the Double International Degree in Business Administration and Economics, 26 from Childhood Teaching Degree, 84 from Primary Teaching Degree, 65 from Social Work Degree, 14 from Sociology, 16 from Agricultural Engineering, 6 from Food Engineering, 41 from Electric Engineering, 60 from Mechanical Engineering, 78 from Industrial Engineering, 22 from Telecommunications Engineering, 34 from Computer Engineering, 13 from Nursing Degree, 37 from Law Degree and 37 from Human Resources Degree. There are some degrees from UPNA University which are not representative on this survey, because there are not answers. This could be caused because of many things, maybe because it was impossible to contact with them or other things like they are a little number of students which doesn't matter if they are included or not. Those degrees are the Double Degree in Business Administration and Law, Physiotherapist Degree and Design Engineering.

The next question which was answered was about, which is the highest course in which you are enrolled? There is a trouble with this question because after the survey was conducted some students told us that they thought that the question was about semesters, no courses, so the results are not really significant. Anyway the conclusions from these

results are that the course of which more students have answered the survey is the first course, 32% of the respondents. On the second position, the second course, with 29% of the respondents. Then, the third course, with 23% of the respondents, and decreasing with the increase of the course, till the sixth course, where there is only the 1% of the respondents.

The next question was about with whom they live, and most of the respondents, the 67, 8% of them, answered that they live with their parents. The second trend of living with in UPNA University is on a shared flat, the 17% of the students live in a shared apartment. The other 15, 2% of the students live alone, in a dorm, in a boarding house, hotel, inn, and guest house, in a relative's home or in other situations.

Then, it was asked a question which would be really interested to be analysed when studying the contingent valuation method related to University fees. This will be really interesting because the question was the following, indicate the source of income with which pays college tuition. So, it is supposed that if a person pays the college with their salary or savings, they would be less favourable to pay more for renewable energy. However, if the university is paid by their parents, they would be more disposed to pay for the use of renewable energy. The 71, 43% of the students answered that the University fees are paid by their parents, the 15, 38% pay it with scholarships, the 7, 21% pay it with their own salary and only the 4, 38% pay the university fees with their savings.

The last three questions about personal things are more interesting for APERNA association. The first one asks the following. College there are currently several groups. Do you belong and / or participate in any university community? Only the 5% of the UPNA University Community answered yes. The second one says, would you be interested in participating in a training course on renewable energy? Surprisingly, the 44, 4% of the respondents answered yes. However, when analysing this question, it has to be taken into account that people didn't thought about the opportunity cost of attending to those classes. People answered yes assuming that they don't have other things to do, if they would have to stop doing something in order to attend to that talks, most of the respondents would change their answer to say no.

And the third questions, which says, do you know APERNA association? The 10, 75% of the students from UPNA University said yes, which means that more than 600 students on this University knows APERNA association.

AVERAGE STUDENT PROFILE

With all the information analysed above it can be obtained the average student profile. This average student profile will be composed by the most typical answers of the respondents to all the questions.

This average student profile is most interested in the topic of education. And its main concern is the climate change. She thinks that the major cause of the climate change is the deterioration of the ozone layer, and the major consequence of the climate change is that it increases the extreme weather events such as heat waves, floods or extreme droughts.

She thinks that the best measure to combat the climate change is to promote the use of renewable energy. Regarding the arguments for and against the development of renewable energy, she thinks that the best argument to support the development of renewable energy is that it doesn't generate air pollution, and the best argument against the development of renewable energy is that it doesn't guarantee a continuous and adequate supply of energy.

This average student profile thinks that overall energy consumption of today's society is excessive. However, it also thinks that her consumption compared to the society is on the average.

It is time to analyse her knowledge about renewable energies. First of all, she knows that nuclear and oil energies are non-renewable ones and that solar, wind and geothermal are renewable energies. This average student doesn't know that firewood is a renewable energy. She thinks that 20% of the energy consumed worldwide is nuclear, and she is wrong, only 5% of the energy consumed worldwide is nuclear. She thinks that 20% of the electricity produced in Navarra in 2014 was generated by the wind farms, and she is wrong, 50% of the electricity produced in Navarra in 2014 was generated by wind farms. She thinks that 10% of the electricity consumption of a household is because the appliances in stand-by and she is wrong. 6, 66% of the percentage of the electricity consumption of a household is because the appliances in stand-by.

It is time to analyse her behaviour in real life. First of all, she answered that if she would be given 1000 Euros to invest in one option, she would choose to promote the use of renewable energy, an answer which could be influenced by all the questions that she answered on this survey before this one. She comes to the University by car, sometimes she shuts down the stand-by and she always shuts down the lights.

Analysing the personnel questions it is shown that she is female, she studies Business Administration, and she is on her first course. She lives with her parents and they are the source of income with which she pays the college. Moreover, she is not a member of any association in the University and she would not be interested in participating in a training

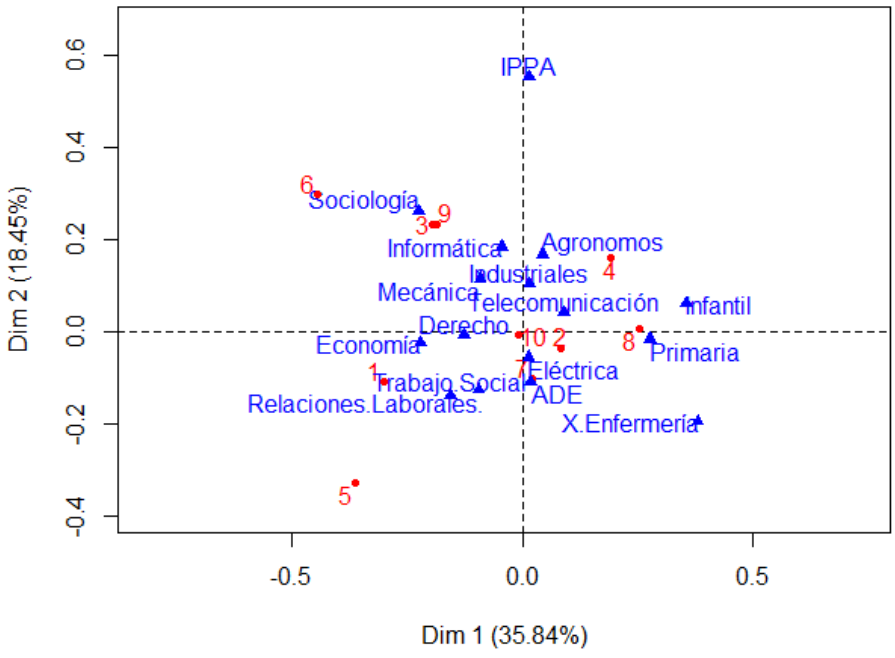
course on renewable energy. Finally, she doesn't know the APERNA association before answering the survey.

DEPENDENCE AND CORRELATION WITHIN DIFFERENT VARIABLES

It is time to start with the second level of analysis, the one developed to analyse the dependence and the correlation between two or more variables.

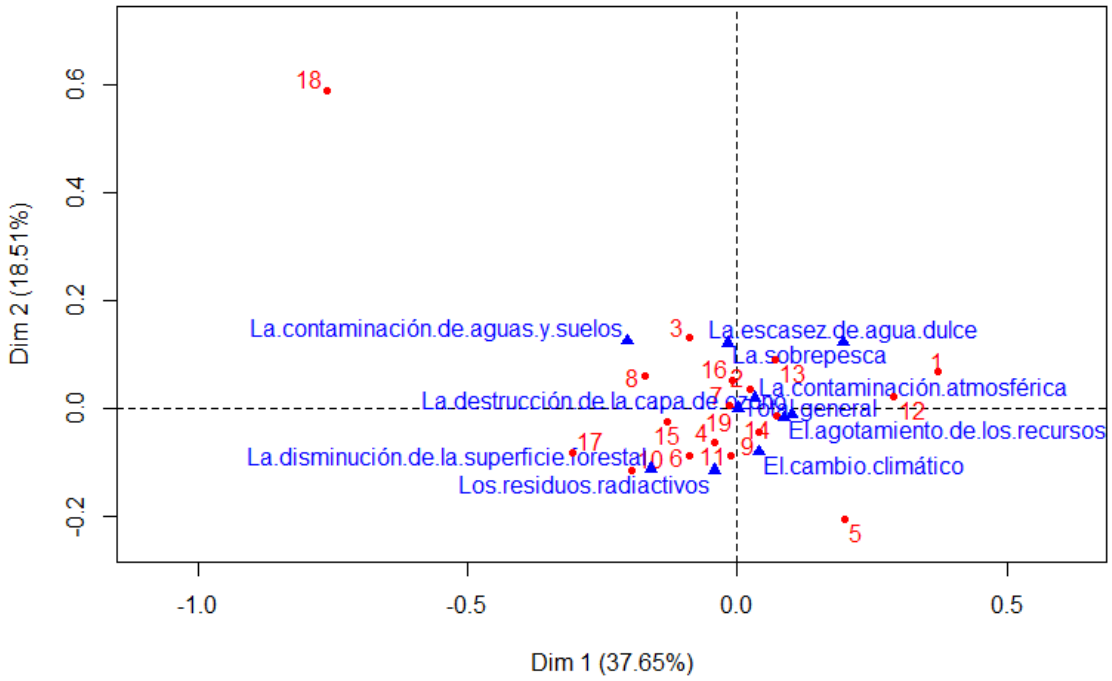
The first study is to analyse the relation between the different degrees and the different things that interest to the respondents. It can be seen in graph 6 that almost the 20% of the variance is explained with the Axis2, and almost 36% of the variance is explained with Axis 1. It also can be seen in graph 6 that number 10, 2 and 7, which corresponds to place of living, unemployment and nationalisms are interest of people who study law, Telecommunications Engineering and Electric Engineering. Moreover, it can be seen that people who study Sociology are more interested on the topic of Migratory movements. This result has a lot of sense because it is related with what they study on their degree. The kind of students which are more interested on the topics number 3 and 9, which corresponds to Education and Terrorism are the students of Sociology and Computer Engineering. The main interest of people who study Childhood teacher is Health, and from people who study Agricultural Engineering the governability. Finally, it has to be mentioned that the people who are interested in corruption are the students of Economics, Social Work and Labour relations.

Graph 6: Interest



It is seen on graph 7 that with the Axis 1 it is explained almost 38% of the variance, and with Axis 2, it is explained almost the 19% of the variance. As it was observed in graph 6, it occurs the same on graph 7, people from the degree in International Business and Administration are really different from the others. Moreover, it is observed that the students which are more concerned about climate change are the ones which study nursing, industrial engineering and labor relations. The respondents which study Law are more concerned about the freshwater shortages and pollution of water and soil. The main concern about the different students from engineering are the ones at the left part of Axis 1, which are the pollution of water and soil, the destruction of the ozone layer, the decrease of forest area and radioactive waste. Moreover, it can be observed that the degrees which are on the center of the graph, Business Administration and Electric engineering are worried about almost all the things, which means that there are people with different ways of thinking on that degrees.

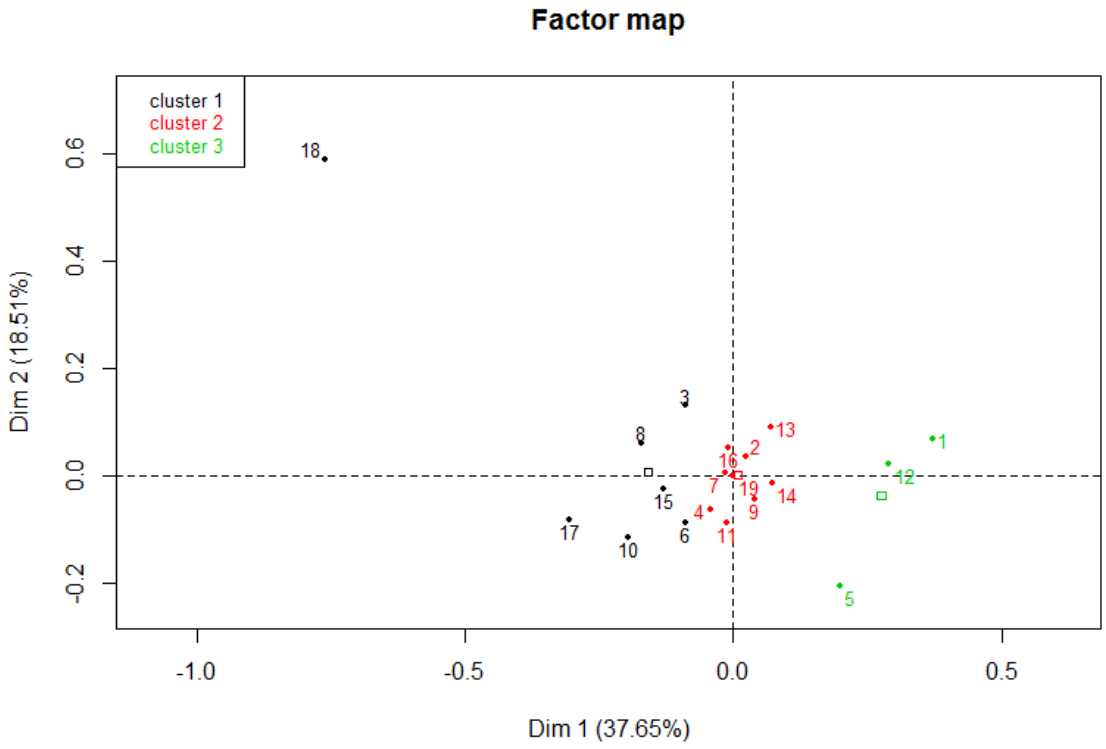
Graph 7: Concerned about environmental problems



It is observed on graph 8 that there are clusters depending on which environmental problems concern students. The first cluster is composed by students who are on the degrees of Law, Agricultural Engineering, Telecommunications Engineering, Computer Engineering, sociology, and the international programs. This first cluster is more worried about pollution of water and soil, the destruction of the ozone layer, the decrease of forest

area and radioactive waste. The second cluster is composed by students who are on the degrees of Business Administration, Economics, Electric Engineering, Industrial Engineering, Mechanical Engineering, Primary Teaching, Labor Relations and Social Work. This cluster is on the center of both Axis, 1 and 2. This means that these students are the most common ones which are concerned about all the environmental problems. However, there are some environmental problems on which are more concerned than in others. Those environmental problems are the atmospheric pollution, the destruction of the ozone layer and resource depletion. The third cluster is worried about the environmental problems which are on the right part of Axis 1, and is composed by students from the degrees in Innovation Processes and Food Products, Nursing and Childhood Teaching. These students are more worried about the atmospheric pollution, resource depletion and the climate change.

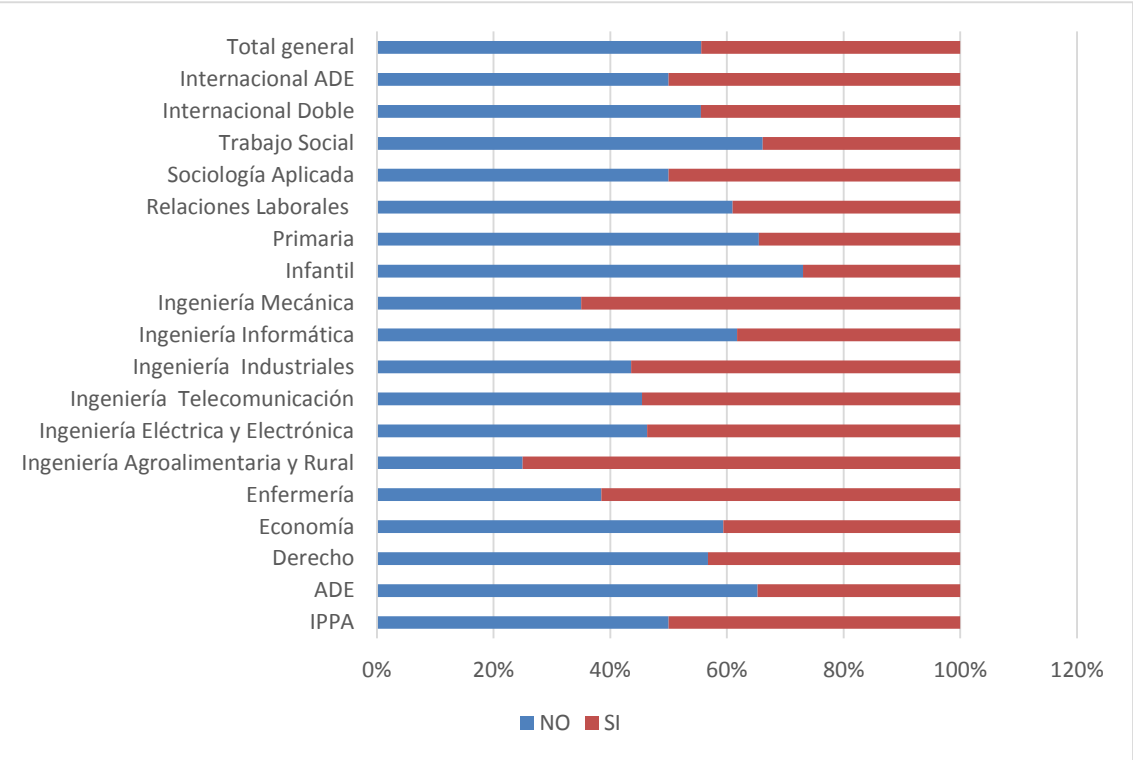
Graph 8: Cluster of concerned about environmental problems



Then, it was decided to study which kind of people would be interested to attend on a course of renewable energy. The results, which are show in graph 9 say that the students which are more interested on attending to courses in renewable energies are the ones that study Social Work, Labour Relations and Human Resources, Teacher of Elementary Education, Teacher of Childhood Education, Industrial Engineering and Business Administration. Moreover, the students which less interested are on attending to courses in

renewable energies are the ones that study Mechanical Engineering, Agricultural and Rural Engineering and Nursing. The other students, corresponding to Economics, Law, different Engineering degrees, the international programs and Sociology, half of the respondents are interested and half of them not. The conclusions obtained with these results are that the most interested ones are the ones which never studied about renewable energies in their degrees.

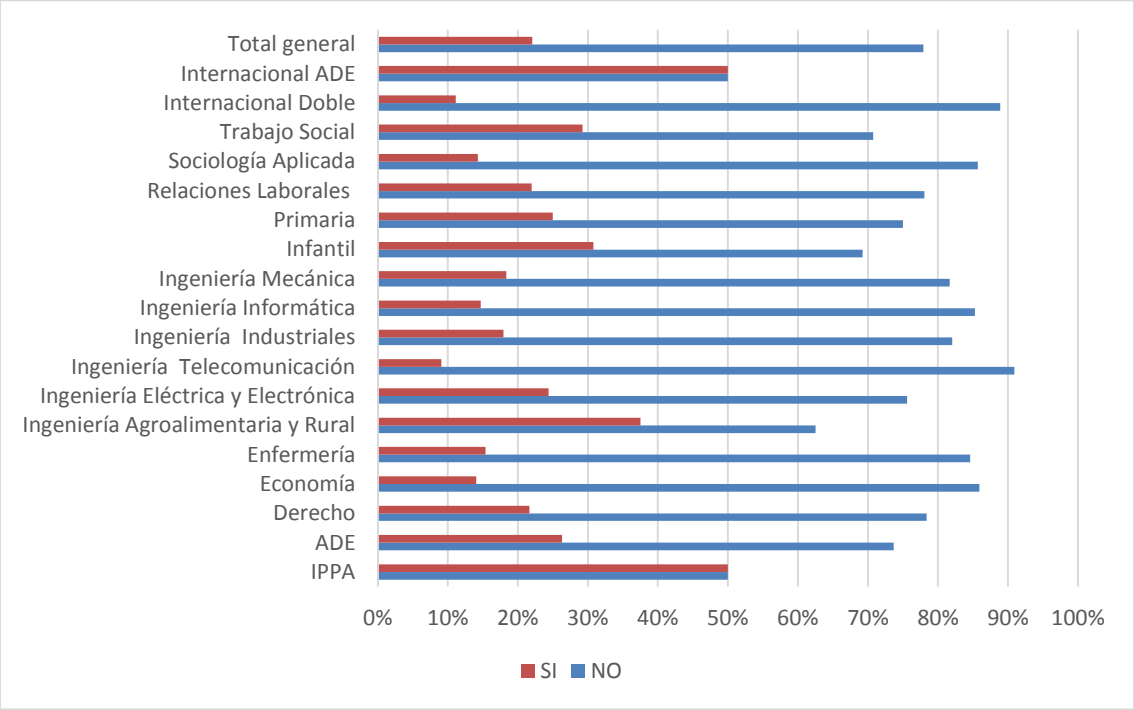
Graph9: I would be interested to attend on a course of renewable energy



On the next graph, number 10, it is studied the knowledge that students have about renewable energies, it was asked if firewood is a renewable energy or not. The correct answer is yes, and only 22% of the respondents matched the correct answer. The only degrees on were half of the respondents matched the correct answer are International Business Administration and Innovation Processes and Food Products. The degrees on which more than 20% of the respondents matched the correct answer are Childhood Education, Elementary Education, Social Work, Agricultural and Rural Engineering, Electrical and Electronic Engineering, Law, Labour Relations and Human Resources and Business Administration. The degrees on which more than 10% of the respondents matched the correct answer are the Double International Degree in Business and Administration, Sociology, Mechanical Engineering, Industrial Technology Engineering,

Computer Engineering, Nursing and Economy. The only degree on which less than 10% of the respondents matched the correct answer is Telecommunications Engineering.

Graph 10: Is firewood a renewable energy



THE WILLINGNESS TO PAY FOR THE USE OF RENEWABLE ENERGIES

It is time to start the third level of analysis of the information, the one focused on the willingness to pay for the use of renewable energies, with the Contingent Valuation Method explained above. On this paper, it is going to be analysed the survey which was created to study the willingness to pay for the use of the parking in UPNA University.

The situation described in the survey in order to create a market was the following: " If you want to cover all energy consumption in the Lecture Hall and the Library of the UPNA with photovoltaic panels, it must be installed 1.5 MW, which would generate an estimated cost of € 1.8 million. It is intended to finance this investment by putting a daily fee for the use of any parking University".

The first question which was asked on that situation was about if the students would be willing to pay a daily fee for the use of the parking in the University in order to undertake this project. The results obtained show that only 44, 77% would pay daily for the use of the parking, and that the 55, 23% would not pay any fee for the use of the parking.

Then when they said no, it was asked the reason why they are not willing to pay a fee for the use of the parking in the university to fund this project. The different answers where the following. Most of the respondents, the 59, 09% of them said that the University

should finance the project using other sources of funding. The 22, 73% answered that this measure penalizes those who have no alternative to the car. The rest of the respondents, almost the 18% of them, answered other different reasons such as that they don't see necessary the investment in photovoltaics, that this measure saturates the public transport services, that this measure forces themselves to stop using the car. Moreover, it was optional to add a comment in other reasons, and the most interesting ones were some like these ones; For people who live in different villages around Pamplona would be really expensive because they have to pay for the trip of going and coming back every day, so if they have to pay an added amount of parking it will cost a lot. Another answer says that this person would decide to change the parking and go to another one which would be free. Another student says that this project doesn't have to be financed only by parking users; this project should be financed by all the students in the University. Another one says that is not viable the saturation of the public transport. Other ones say that they pay enough each semester and this must be financed by public funds. It is not strange that almost all the comments mentioned above are written by people who come to the University by car.

When people answered yes, the next question asked in the survey was about what rate they would be willing to pay per day for the use of parking to finance this project. The most typical answer, the one which 53,27% of the students from UPNA which answered that survey and said that they would paid clicked is that they would pay 0,5 Euros per day, the smallest amount that we offered to them on the list. The second most typical answer was that they would pay 1 Euro per day, almost 35% of the respondents which answered they would have paid, clicked on that option. Only the 4% answered that they would paid 1,5 Euros, and only 3% of the respondents answered that they would paid 2 Euros. No one answered that they would paid 2,5 Euros per day, and the 5,61% answered that would pay 3 Euros per day.

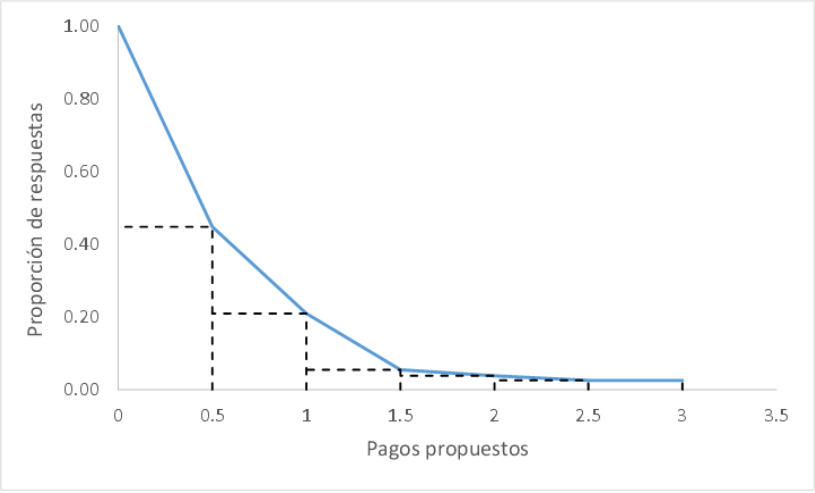
Although they said yes, it was also asked what is the reason why they are willing to pay a fee for the use of the parking of the University to fund this project, and the different answers were the following. There is one answer which is considered the protest response, and can have significant implications for the mean in the WTP. The protest response is considered to be the people who said that polluter must pay. The number of respondents who clicked on this protest response are the 11, 21% of the students who answered the survey and said that they would pay.

The most clicked answer, with 32, 71% of the responses, is the one which says that this measure encourages the use of alternative means of transport. The second most clicked answer, with 28, 04% of the responses, is that the measure will reduce the number of cars which will reduce air pollution. Another answer which many students from the University choose is the one which says that the photovoltaic project is really interesting. The less clicked one is the one which says that the measure will reduce the number of cars which will facilitate parking. This last answer means that people doesn't have many problems when parking in the University in their daily lives, because they don't want to make any effort in order to find a parking place easier.

As it happened on the case of why people are willing to pay a fee for the use of the parking, there are many people, 7,48% of the respondents, which said that their reason for not being willing to pay for the use of the parking of the University to fund this project are other reasons. Moreover, it was optional to add a comment in other reasons, and the most interesting ones were some like these ones; it will reduce the number of people which are going to use the private means of transport, and the people who will continue using the car will contribute to decrease the CO2 emissions of UPNA University. Another one says that this will not assume a high expenditure and we will contribute to the environment. It will increase the amount of people which will try to use other means of transport like the bikes or the public transport and in few years the costs of the construction of this project will be redeemed. Another amount of respondents answered yes because they come walking so they prefer to implement this project of paying for the use of the car, so more people will come walking too.

It is time to analyse the average willingness to pay; the mean is 0, 89 Euros per respondent.

Graph 2: Demand



A	0.1381
B	0.2238
C	0.0596
D	0.1046
E	0.0387
F	0.0272
G	0.0042
H	0.0188
I	0.0031
J	0.0126
K	0.0126
SUMA (DAP)	**0.6433**

This graph shows how the demand varies when the amount of money which has to be paid in order to use the University parking increases. It can be seen that when the proposed payments are 0, all the respondents are willing to park in UPNA parking. However, when the price which has to be paid increases, the amount of people which is willing to pay for UPNA parking decreases. The maximum willingness to pay per person is 0, 6433 Euros. This maximum willingness to pay is the area which is downwards the demand curve. This number is calculated by multiplying each triangle or quadrangle, and then aggregating all the values of it.

It is time to calculate an approximation to the aggregate maximum willingness to pay. In order to make this approximation it is taken into account as the target people 1924 parking places for cars (this quantity is calculated as the aggregation of all the parking places which there are around all the University such as the Aulario, principal ship, the Sadar stadium, the sario, internship finca, sports and biotechnology) and the number of school days which there are during one University course (the number of school days are 18 weeks per semester and 5 days per week, and supposing that there are some festivity days, the total number of school days during one course would be around 170). In order to calculate the target, it has to be multiplied the parking places by the number of school days, 170*1924, which makes a total amount of target of 327080 units.

If it is supposed that all the parking places get filled during all the school days, the aggregate maximum willingness to pay of the students would be the target units multiplied by the maximum willingness to pay, 327080 * 0, 6433 Euros = 210,410'564 Euros per year.

If we consider that the total cost of the photovoltaic panels would be 1800,000,000 Euros, it will take 1800,000,000 Euros / 210,410'564 Euros per year = 8554, 70355566 years to amortize the cost of the photovoltaic panel.

It is time to calculate an approximation to the minimum value of the aggregate maximum willingness to pay. In order to make this approximation it is taken into account as the target people 662 parking places for cars (this quantity is calculated as the parking places which there in the main place were all the students from UPNA University park, the Aulario) and the number of school days which there are during one University course (the number of school days are 18 weeks per semester and 5 days per week, and supposing that there are some festivity days, the total number of school days during one course would be around 170). In order to calculate the target, it has to be multiplied the parking places by the number of school days, 170*662, which makes a total amount of target of 112540 units.

If it is supposed that all the parking places get filled during all the school days, the minimum value of the aggregate maximum willingness to pay of the students would be the target units multiplied by the maximum willingness to pay, 112540 * 0, 6433 Euros = 72,396'982 Euros per year.

If we consider that the total cost of the photovoltaic panels would be 1800,000,000 Euros, it will take 1800,000,000 Euros / 72,396'982 Euros per year = 24862,915 years to amortize the cost of the photovoltaic panel. This minimum surplus approximation can be criticized because some students will move to other parking's around the University which would be free to park there. Such as Sario parking, principal ship and the Sadar stadium parking.

On these calculations we didn't consider the benefits of the use of renewable energies. There are other costs involved as the benefits for the environment and the cost of the energy which is being expended nowadays, which must be taken into account in our study.

As all the protest responses and all the comments against paying a fee in order to use the parking in UPNA University come from the people who come to the University by car, it is expected that the average willingness to pay will vary among people who come to the University by car and people who come to the University by other different means of transport.

Because of what has been mentioned above it is decided to study the average willingness to pay separating the people by means of transport.

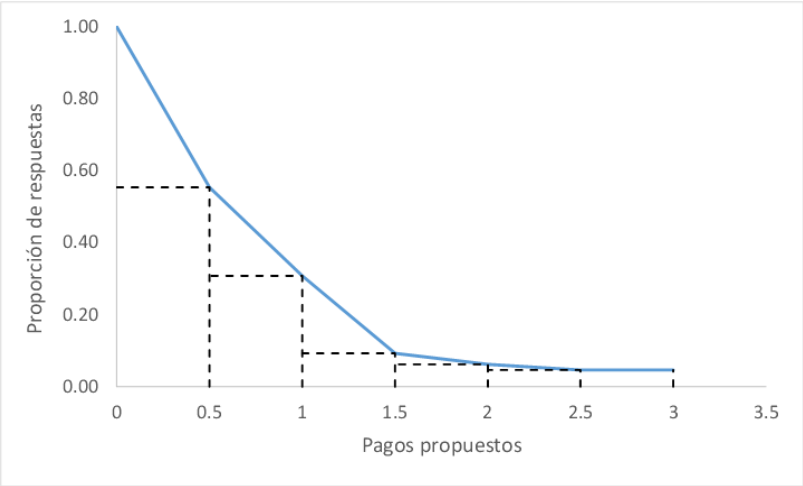
The results obtained show that there are two different segments. On the one hand the segments which come to the University by car or by shared car. Their willingness to pay is lower than the total willingness to pay. This means that they are less willing to pay because they use it and they don't want to pay for the use of this service. On the other hand, there is a segment, the one of the people which goes to the University by walking, public transport or by bike, which would be willing to pay for the use of the parking, and their willingness to pay is higher than the total average.

It is going to be performed a more specific analysis of this two kind of means of transport. More concretely, as the means of transport of the car and walking are the most representative ones, we are going to make the analysis of this two means of transport and then compare it with the total.

THE WILLINGNESS TO PAY FOR THE USE OF RENEWABLE ENERGIES, WALKING

The mean for the respondents which go to the University walking is 1, 00 Euros per respondent.

Graph 3: Demand of people who goes to the University by walk



A	0.1115
B	0.2769
C	0.0615
D	0.1538
E	0.0538
F	0.0462
G	0.0077
H	0.0308
I	0.0038
J	0.0231
K	0.0231
SUMA (DAP)	**0.7923**

The maximum willingness to pay per person is 0, 7923 Euros. This amount is higher than the total, which was 0, 6433 Euros. These results explain that people which go to the University walking want to implement the photovoltaic project and they think that people should pay for it, in an amount higher than the average. As this people who go walking to the University will continue going walking, they want that all the people which pollute the environment pay money. This thinking of the people walking could be by 2 reasons. On the one hand, they want to implement the project and people which go to the University by car will continue using the car will contribute to decrease the CO2 emissions of UPNA University because they are going to pay the photovoltaic project in few years. On the other hand, if this payment fee is implemented, more people will try to avoid using the car for going to the University, so this will reduce the CO2 emissions.

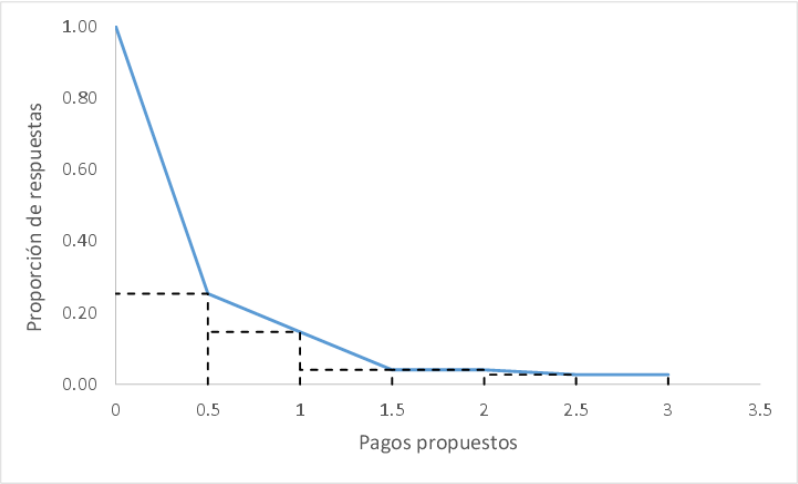
The aggregate maximum willingness to pay is the target people multiplied by the maximum willingness to pay: 327080 * 0, 7923 Euros = 259145,484 Euros per year.

The minimum value of the aggregate maximum willingness to pay is the target people multiplied by the maximum willingness to pay 112540 * 0, 7923 Euros = 89165,442 Euros per year.

THE WILLINGNESS TO PAY FOR THE USE OF RENEWABLE ENERGIES, BY CAR

The mean for the respondents which go to the University y car is 1, 050 Euros per respondent.

Graph 4: Demand of people who goes to the University by car



A	0.1867
B	0.1267
C	0.0267
D	0.0733
E	0.0267
F	0.0200
G	0.0000
H	0.0200
I	0.0033
J	0.0133
K	0.0133
SUMA (DAP)	**0.5100**

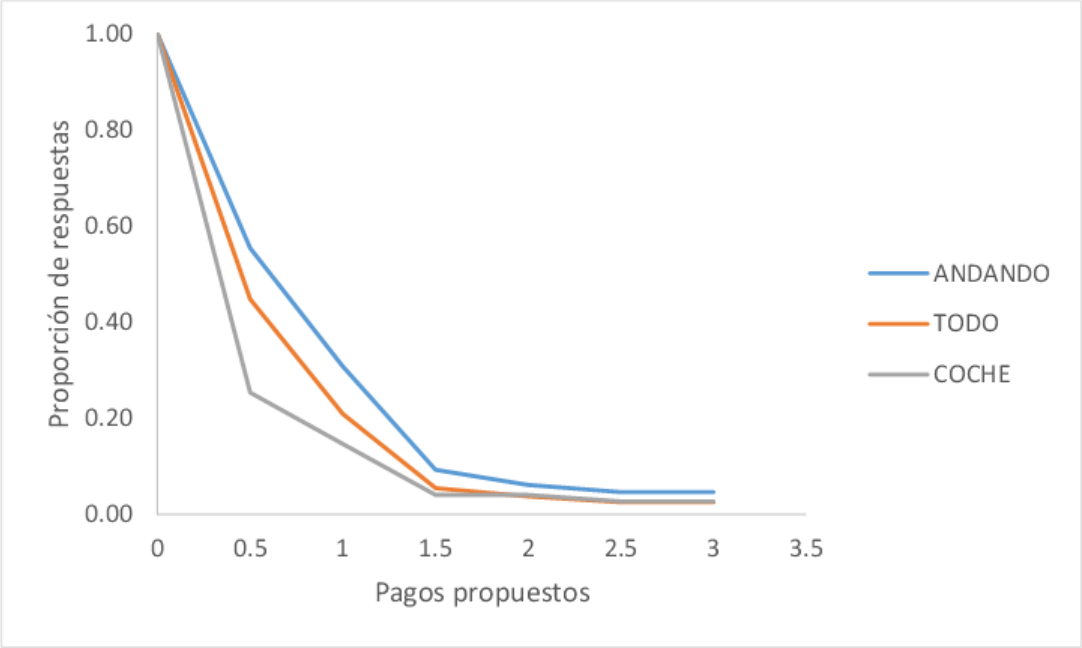
The maximum willingness to pay per person is 0, 5100 Euros. This amount is lower than the total, which was 0, 6433 Euros, and really lower than the people which goes walking, which is 0, 7923 Euros. These results explain that people who go to the University by car don't want to implement the photovoltaic project and they think that this project must be financed by public funds. As this people who go to the University by car wants to continue going by car, they wrote many comments into the survey in order to avoid this photovoltaic project being implemented.

Their main reasons are that University should finance the project using other sources of funding, also they said that this penalizes those who have no alternative to the car, some of them don't see necessary the investment in photovoltaics and also some said that this measure saturates the public transport services.

The aggregate maximum willingness to pay is the target people multiplied by the maximum willingness to pay: 327080 * 0, 5100 Euros = 166810,8 Euros per year.

The minimum value of the aggregate maximum willingness to pay is the target people multiplied by the maximum willingness to pay 112540 * 0, 5100 Euros = 57395,4 Euros per year.

Graph 5: Summary of the total, by car and by walk



In conclusion, as it can be seen in the graph above, the maximum willingness to pay is higher than the total for people who go to the University walking, and the maximum willingness to pay is lower for than the total for people which go to the University by car.

4.2.8. Making decisions or design strategies

After analysing all the data obtained with the survey, the target market of students who will be willing to learn about renewable energies are students from the degrees of Social Work, Labour Relations and Human Resources, Teacher of Elementary Education, Teacher of Childhood Education, Industrial Engineering and Business Administration. APERNA talks will be effective if they focus their talks on climate change, which is the main concern of those students. APERNA talks could talk about the deterioration of the ozone layer, because it is thought that is the major cause of climate change, and about the increase of extreme weather events such as heat waves, floods or extreme droughts, because it is thought that is the major consequence of climate change. It is interesting to talk about the measures to combat the climate change, because it is thought that the best one is the promotion and use of renewable energy. Moreover, it could be interesting to give the talks about the arguments for and against the development of renewable energy, and remember to the people that we are over consuming energy, and it is really important to reduce it. There is a lot of ignorance about renewable energies, so it could be interesting to clarify all the responses in the survey. As 45% of the students would pay daily for the use of the parking, it is interesting to think and propose to the University a project in order to supply UPNA with renewable energy. However, the maximum willingness to pay is 0, 6433 Euros

per day, per person, so it would take 8554 years to finance this project. As almost the 60% of the respondents said that the University should finance the project using other sources of funding, so, it could be interesting to propose the project to the University, to the town hall of Pamplona, and to many companies of renewable energies around Navarra in order to carry out this project.

CONCLUSIONS

What has been achieved with this study has been the degree of knowledgement that students have about renewable energy, the perceptions that these students have about this kind of energies and how much they are interested on it. Moreover, to know their real attitudes and commitment and if they really care about the issue of global warming and the use of energy from renewable sources to mitigate Climate Change.

Another conclusion from this investigation is that in UPNA University there is not a huge difference between students from different degrees, and that people would be willing to pay for the use of the parking in order to supply the energy with renewable energies.

The development of this project has helped me to learn about renewable energies and about some different methods to analyse databases. The methods are the contingent valuation method (CVM) and the correspondence analysis (CA). Moreover, the development of the project has helped me to adopt some skills such as the ability to gather and interpret relevant data to inform judgments that include reflection on relevant social, scientific or ethical, the capacity of analysis and synthesis, organizational skills and planning, the skill of oral and written communication in a foreign language, the ability to analyse and seek information from different sources, and the creativity. I have adopted such skills in depth with the development of the survey, the process of passing it through the students, the analysis of the data and writing this paper.

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ANNEXED

1- Survey

The following survey is part of a project from the Economics Department with the collaboration of APERNA association. Please, answer to the following questions in order. When you finish, please click on send. Remember that this survey is anonymous.

Thank you for helping us with this project.

1. From the following questions, indicate the ones that you are most interested in. (With a maximum of three).

A	Unemployment	
B	Health	
C	Education	
D	Living place	
E	Environment	
F	Corruption	
G	Governance and politics	
H	Nationalisms	
I	Migration movements	
J	Terrorism	

2. From the following environmental problems, indicate the ones that you are more concerned about. (With a maximum of three).

A	The destruction of the ozone layer	
B	The decrease in forest area	
C	Overfishing	
D	Biodiversity loss	
E	The depletion of non-renewable resources (oil, gas, minerals ...)	
F	Climate change	
G	The atmospheric pollution	
H	Pollution of water and soil	
I	The shortage of fresh water	
J	Radioactive waste	

3. Regarding the causes of climate change, indicate the influence they have in their opinion the following factors in climate change.

		1 No influence	2 Little influence	3 Moderate influence	4 Considerable influence	5 Much influence
A	Natural cycles of warming and cooling of the Earth.					
B	The deterioration of the ozone layer.					
C	The burning of fossil fuels in industrial processes					
D	The burning of fossil fuels in transport and heating					
E	Forest clearing					
F	Livestock and farms					

4. Regarding the consequences of climate change indicate your opinion on the probability of occurrence any of these facts.

		1 Not at all likely	2 Unlikely	3 Quite likely	4 Very likely	5 Certainly
A	Our generation will see the consequences of CC					
B	The CC increases extreme weather events (heat waves, floods, extreme droughts)					
C	The CC causes of biodiversity loss					
D	The CC will cause migration of population					
E	The CC force to change energy sources					
F	The CC sea level increases					

5. Regarding measures to combat climate change indicate the degree of effectiveness that, in their opinion, have or will take the following measures.

		1 Nothing effective	2 Little effective	3 Moderately effective	4 Quite effective	5 Highly effective
A	International agreements such as the Kyoto Protocol or the Paris Agreement					
B	Individual performances as recycling, using public transport or insulate homes					
C	Promote the reduction of energy consumption					
D	Promote the use of renewable energy					

6. The following arguments are used to SUPPORT THE DEVELOPMENT OF RENEWABLE ENERGY. How important do you consider each?

		1 Nothing important	2 Less important	3 Moderate importance	4 Fairly important	5 Very important
A	Fossil fuels are running out and renewable energy are an alternative					
B	Renewable energy does not generate air pollution					
C	Renewable energies reduce the energy dependence of nations					
D	Renewable energies promote employment, investment in R & D and development of new economic sectors					

E	Renewable energies reduce the variability of energy prices					

7. From the above arguments that support the development of renewable energies, indicate which is the most relevant to you.

A	B	C	D	E

8. The following arguments are used AGAINST DEVELOPMENT OF RENEWABLE ENERGY. Indicate in its opinion, the importance of each.

		1 Nothing important	2 Less important	3 Moderate importance	4 Fairly important	5 Very important
A	Renewable energies are not profitable if they are not subsidized					
B	Renewable energies do not guarantee a continuous and adequate supply of energy					
C	Renewable energy is not safe for the environment (photovoltaic waste, landscape modification, alteration of ecosystems)					
D	The implementation of large-scale renewable energy needs a lot of area of land that may not engage in other activities.					
E	Nuclear energy is an alternative energy renewable energy					

9. From the above arguments against the development of renewable energies, indicate which is the most relevant to you.

A	B	C	D	E

SECCIÓN D1 – VALUATION - SOLAR ENERGY THROUGHOUT THE UPNA - VEHICLE PAYMENT FEES

If you want to cover the entire energy consumption of the UPNA with photovoltaic panels must be installed 5MW, generating an estimated cost of € 6 million. It seeks to recover all the investment through the rise in tuition fees (fees) over the 20 year life of the facility. Given that the average price of an annual enrolment at the University is 1000 Euros.

10. Would you be willing to take a rise in tuition fees for the University to carry out this photovoltaic project?

Yes	
No	

If your answer is NO, go to question 12.

11. What price rise would be willing to pay an annual enrolment to finance this photovoltaic project?

From 0 to 25 €		From 150 to 175 €	
From 25 to 50 €		From 175 to 200 €	
From 50 to 75 €		From 200 to 225 €	
From 75 to 100 €		From 225 to 250 €	
From 100 to 125 €		From 250 to 275 €	
From 125 to 150 €		From 275 to 300 €	

If you have answered question 11, go to question 13

12. What is the reason that it is not willing to pay a rate hike for the university to cover all its energy with photovoltaic panels?

A	I not seem necessary investment in photovoltaic's	
B	Tuition fees are already high	
C	The university should finance the project using other funding sources	
D	A rise in tuition fees should be used to improve teaching	
E	I have no financial capacity to assume an increase in tuition fees	
F	Only those who are in favour of this investment should finance	
G	Is an investment too costly and environmental benefits are very small if it does just the UPNA	
H	Other reasons	

SECCIÓN D2 – VALUATION - AULARIO ENERGY AND LIBRARY - VEHICLE PARKING PAYMENT

If you want to cover all energy consumption in the Lecture Hall and the Library of the UPNA with photovoltaic panels must be installed 1.5 MW, which would generate an estimated cost of € 1.8 million. It is intended to finance this investment by putting a daily fee for the use of any parking University.

10. Would you be willing to take a fee for use of the parking for the University to undertake this project?

Yes	
No	

If your answer is NO, go to question 12B.

11. What rate would you be willing to pay per day for the use of parking to finance this project?

0,50 €	
1,00 €	
1,50 €	
2,00 €	
2,50 €	
3,00 €	

Go to question 12A. Do not answer the question 12B.

12A. What is the reason that if you are willing to pay a fee for the use of parking of the university to fund this project?

A	The photovoltaic project is really interesting	
B	The measure will reduce the number of cars which facilitates parking	
C	The measure will reduce the number of cars which will reduce pollution	
D	Polluter pays	
E	The measure encourages the use of alternative means of transport	
F	Other reasons	

12B. What is the reason that it is not willing to pay a fee for the use of parking of the university to fund this project?

A	I not seem necessary investment in photovoltaic	
B	The university should finance the project used other sources of funding	
C	This measure penalizes those who have no alternative to the car	
D	This measure saturates the public transport services	
E	This measure forced me to stop using the car	

F	Other reasons	

SECCIÓN D3 – VALUATION - SOLAR ENERGY IN REPROGRAPHY

If you want to cover the energy consumption of reprographic service with photovoltaic panels required an investment of 14 000 €. It is intended to finance this investment with a rise in the price of each copy / print this service. Given that a photocopy / print reprographics service currently costs 7 cents.

10. Would you be willing to take a rise in the price of each copy / printing to be carried out this project?

Yes	
No	

If your answer is NO, go to question 12.

11. What increase in the price of each copy / print is willing to pay to be carried out this project?

0,5 céntimos	
1,0 céntimo	
1,5 céntimos	
2,0 céntimos	
2,5 céntimos	
3,0 céntimos	

If you have answered question 11, go to question 13

12. What is the reason that it is not willing to pay an increase in the price of each copy / print to finance this photovoltaic project?

A	I not seem necessary investment in photovoltaics	
B	The University should take the overpricing	
C	The concessionaire should take the overpricing	
D	Other reasons	
E	The price rise forced me to look elsewhere for photocopy / print	

13. How do you think is overall energy consumption of today's society?

a. Little

b. Low

c. Right

d. High

e. Excessive

14. Then various energies are indicated. Indicate for each of them, whether or not renewable energy

		Renewable	Nonrenewable
A	Nuclear		
B	Oil		
C	Solar		
D	Wind		
E	Firewood		
F	Geothermal		

15. What percentage of the energy consumed worldwide is nuclear?

a. 5%

b. 20%

c. 50%

d. 98%

16. In relation to the society in which they live, how would you rate the energy that you consume?

a. Well below the average

b. Below the average

c. On the average

d. Above Average

e. Very above average

17. Of the electricity produced in Navarra in 2014, what percentage generated the Wind farms?

a. 5%

b. 20%

c. 50%

d. 98%

18. What percentage of electricity consumption of a household because the appliances in stand-by?

a. 1%

b. 5%

c. 10%

d. 20%

19. If you give 1000 Euros to invest in one of these options. What would you choose?

a.Better computers for UPNA

b.Promote youth associations

c.Increase the manuals in the Library

d.Promote the use of renewable energy

e.Buy Microwave ovens for student use

f. Buy containers to facilitate separation of waste in college

20. What means of transport used most often to come to college?

a. Bicycle

b. City bus (villavesa)

c. Car

d. Walking

e. Car sharing

f. Motorcycle

g.Others

21. Do you worry about shutting down the standby electronics in your home?

a. Always

b. Sometimes

c. Never

22. Do you worry about turning off the lights of your home when moving from one room to another?

a. Always

b. Sometimes

c. Never

23. How often do you use the photocopying service?

a. Usually

b. Occasionally

c. Never

24. Gender

a. Man

b. Woman

25. Age in years

26. What grade is studying at the UPNA?

Degree in Economics

Degree in Business Administration and Management

International Degree Program in Business Administration

International Double Degree Program in Business Administration and Economics

Master degree in Early Childhood Education / Haur Hezkuntzako Irakasleen Gradua

Master degree in Elementary Education / Lehen Hezkuntzako Irakasleen Gradua

Degree in Social Work

Degree in Applied Sociology

Degree in Agricultural Engineering and Rural

Degree in Innovation Processes and Food Products

Degree in Electrical and Electronic Engineering

Degree in Mechanical Engineering

Degree in Mechanical Design

Degree in Industrial Technology Engineering

Degree in Telecommunications Technology

Degree in Computer Engineering

Degree in Nursing

Degree in Physiotherapy

Degree in law

Degree in Labour Relations and Human Resources

Double Degree in Business Administration and Law

27. Highest course in which you are enrolled

First

Second

Third

Fourth

Fifth

Sixth

28. Indicate with whom you live

I live alone

I live with my parents

I live in a shared apartment

I live in a dorm, Colegio Mayor

I live in a boarding house, hotel, inn, guest house

I live in a relative's home

Other situations

29. Indicate the source of income with which pays college tuition

a. It is paid by my parents

b. I pay it with my savings

c. It is paid with my salary

d. Scholarships

e. Others

30. In college there are currently several groups (For example: Ikasle Abertzaleak, Eraldatu, University Group, Engineers Without Borders, etc). Do you belong and / or participate in any university community?

Yes

No

31. Would you be interested in participating in a training course on renewable energy?

a. yes

b. no

32. Do you know the APERNA association?

a. yes

b. no

2- EU renewable energy policies for 2020 and 2030

From: European Environmental Agency (EEA)

Renewable energy in Europe 2016 - Recent growth and knock-on effects

http://www.eea.europa.eu/publications/renewable-energy-in-europe-2016

Box 1.1 EU renewable energy policies for 2020 and 2030

A combination of national targets and objectives has been set for each Member State regarding reductions in GHG emissions, gross final consumption of renewable energy and improvements in energy efficiency.

- Meeting the 20 % binding EU-wide renewable energy target is mandated by the RED and depends on each Member State's achievement of its national 2020 RES target.
- Under the RED country NREAP reports of 2010, Member States were required to outline the **expected trajectories** of their national RES shares from 2010 up to 2020. Countries also have to report biennially on national progress towards **indicative** RED and **expected** NREAP targets. National progress reports were submitted to the European Commission in 2011, 2013 and in December 2015.
- The RED includes a set of sustainability criteria for liquid biofuels consumed in transport. To address the negative environmental consequences of indirect land-use change caused by some types of biofuels, the RED was amended in 2015. In 2012, the European Commission proposed to limit the contribution of food-based biofuels to a maximum of 5 %. A political agreement was reached in 2015, to cap the amount of biofuels produced from energy crops grown on agricultural land to at most 7 % of all final transport energy consumption in 2020. In accordance with this agreement, Member States are to set national targets for advanced biofuels in their legislation (EU, 2015a; EU, 2015b).

Targets and trajectories for reductions in GHG emissions and for RES shares were set jointly under the 2009 climate and energy package, so the expected reductions in emissions from RES in the run-up to 2020 were taken into account when setting the GHG targets.

In addition to the legally binding targets for 2020, the EU has recently adopted an energy and climate framework for 2030. This framework sets out a target for the renewable energy share in 2030 and was adopted in late 2014 in a decision by the European Council (EU, 2014). The binding EU-wide RES target for 2030 is not accompanied by specific national targets. National plans will have to flesh out concrete measures to reach that binding EU-wide target. The Council's decision calls on Member States to agree on the governance process for their design and implementation.

Specifically, three new EU-wide commitments for climate and energy for the year 2030 include (EU, 2014):

- a binding minimum 40 % domestic reduction in GHG emissions compared with 1990 levels;
- a binding minimum 27 % share of GFEC;
- an indicative minimum 27 % improvement in energy efficiency.

3- Table 1: Target

	Total number of students	Total number of students		Sample size	Lower courses (1-2)	Higher courses (3-4)	Finally respondents
FCS	613						
		391	Enf	59	47 (30 si se separa)	47	13
		222	Fisio	33	(17)		0
ETSIA	428						
		307	IAMR	46	23	23	16
		121	IPPA	18	9	9	6
ETSIIT	1921						
		273	INF	41	21	21	34

		337	TEL	51	26	26	22
		215	ELEC	32	16	16	41
		385	MEC	58	29	29	60
		593	TIND	89	45	45	78
		118	DMEC	17	9	9	0
FCJ	712						
		261	RRLL	39	20	20	41
		280	DER	42	21	21	37
		171	DOBLE	26	13	13	9
FCHS	1735						
		440	EINF	66	33	33	26
		735	PRIM	111	56	56	84
		152	SOC	23	12	12	14
		408	TS	61	31	31	65
FCEE	1235						
		888	ADE	134	67	67	95
		248	ECO	37	19	19	64
		99	INTNL	15	8	8	2
	6644						

Source: data from UPNA University 2015

4- Table 2: Interest

From the following questions, indicate the ones that you are most interested in.	YES	NO
Unemployment	49,72%	50,28%
Health	46,60%	53,40%
Education	71,535	28,47%
Living place	12,89%	87,11%
Environment	25,50%	74,50%
Corruption	28,05%	71,95%
Governance and politics	21,95%	78,05%
Nationalisms	5,67%	94,33%
Migration movements	10,34%	89,66%
Terrorism	20,40%	79,60%

5- Table 3: Concern

From the following environmental problems, indicate the ones that you are more concerned about.	YES	NO
The destruction of the ozone layer	36,21%	63,79%
The decrease in forest area	35,50%	64,50%
Overfishing	3,82%	96,18%
Biodiversity loss	23,76%	76,24%
The depletion of non-renewable resources (oil, gas, minerals ...)	30,27%	69,73%
Climate change	65,06%	34,94%
The atmospheric pollution	29,84%	70,16%
Pollution of water and soil	47,95%	52,05%
The shortage of fresh water	18,53%	81,47%
Radioactive waste	17,53%	82,32%

6- Table 4: Causes

Causes of climate change	1 No influence	2 Little influence	3 Moderate influence	4 Considerable influence	5 Much influence	Median
Natural cycles of warming and cooling of the Earth.	6,65%	22,77%	31,97%	20,79%	17,82%	3,20367751
The deterioration of the ozone layer.	1,27%	3,96%	15,13%	39,32%	40,31%	4,13437058
The burning of fossil fuels in industrial processes	1,41%	6,08%	18,25%	36,21%	38,05%	4,03394625
The burning of fossil fuels in transport and heating	0,99%	7,64%	23,90%	36,92%	30,55%	3,88401697
Forest clearing	1,41%	5,37%	22,49%	38,90%	31,82%	3,94342291
Livestock and farms	8,63%	26,59%	35,36%	20,79%	8,63%	2,94200849

7- Table 5: Consequences

Consequences of climate change	1 Not at all likely	2 Unlikely	3 Quite likely	4 Very likely	5 Certainly	Median
Our generation will see the consequences of CC	2,69%	16,97%	24,75%	29,42%	26,17%	3,594059406
The CC increases extreme weather events (heat waves, floods, extreme droughts)	0,57%	2,26%	16,41%	37,91%	42,86%	4,20226308
The CC causes of biodiversity loss	0,57%	2,26%	20,93%	43,56%	32,67%	4,05516266
The CC will cause migration of population	3,25%	18,95%	31,97%	28,85%	16,97%	3,37340877
The CC force to change energy sources	0,99%	7,64%	20,37%	36,35%	34,65%	3,96039604
The CC sea level increases	0,85%	3,96%	17,40%	31,26%	46,53%	4,18670438

8- Table 6: Measures to combat

Measures to combat climate change	1 Nothing effective	2 Little effective	3 Moderately effective	4 Quite effective	5 Highly effective	Median
International agreements such as the Kyoto Protocol or the Paris Agreement	7,50%	27,30%	33,95%	23,34%	7,92%	2,9688826
Individual performances as recycling, using public transport or insulate homes	1,41%	9,90%	26,59%	37,91%	24,19%	3,73550212
Promote the reduction of energy consumption	1,84%	8,49%	25,88%	40,31%	23,48%	3,75106082
Promote the use of renewable energy	0,71%	3,25%	15,84%	33,80%	46,39%	4,21923621

9- Table 7: Arguments to support renewable energy

Arguments used to support the development of renewable energy	1 Nothing important	2 Less important	3 Moderate importance	4 Fairly important	5 Very important	Median
Fossil fuels are running out and renewable energy are an alternative	0,57%	5,37%	22,77%	42,43%	28,85%	3,93635078
Renewable energy does not generate air pollution	1,13%	5,80%	20,23%	33,24%	39,60%	4,04384724
Renewable energies reduce the energy dependence of nations	0,85%	6,93%	28,15%	36,49%	27,58%	3,83026874
Renewable energies promote employment, investment in R & D and development of new economic sectors	0,71%	5,52%	23,34%	38,19%	32,25%	3,95756719
Renewable energies reduce the variability of energy prices	2,40%	10,89%	35,50%	32,25%	18,95%	3,54455446

Table 8: Arguments to support renewable energy

Arguments used to support the development of renewable energy	Fossil fuels are running out and renewable energy are an alternative	Renewable energy does not generate air pollution	Renewable energies reduce the energy dependence of nations	Renewable energies promote employment, investment in R & D and development of new economic sectors	Renewable energies reduce the variability of energy prices
	25,60%	39,04%	12,73%	20,23%	2,40%

10- Table 9: Arguments against renewable energy

Arguments used against the development of renewable energy	1 Nothing important	2 Less important	3 Moderate importance	4 Fairly important	5 Very important	Median
Renewable energies are not profitable if they are not subsidized	8,91%	22,07%	36,35%	25,32%	7,36%	3,00141443
Renewable energies do not guarantee a continuous and adequate supply of energy	7,07%	16,97%	36,49%	28,43%	11,03%	3,19377652

Renewable energy is not safe for the environment (photovoltaic waste, landscape modification, alteration of ecosystems)	6,08%	21,50%	37,34%	24,61%	10,47%	3,11881188
The implementation of large-scale renewable energy needs a lot of area of land that may not engage in other activities.	10,33%	26,59%	31,26%	24,05%	7,78%	2,92362093
Nuclear energy is an alternative energy renewable energy	26,45%	23,62%	23,76%	16,12%	10,04%	2,59688826

Table 10: Arguments against renewable energy

Arguments used against the development of renewable energy	Renewable energies are not profitable if they are not subsidized	Renewable energies do not guarantee a continuous and adequate supply of energy	Renewable energy is not safe for the environment (photovoltaic waste, landscape modification, alteration of ecosystems)	The implementation of large-scale renewable energy needs a lot of area of land that may not engage in other activities.	Nuclear energy is an alternative energy renewable energy
	18,81%	30,41%	24,33%	12,59%	13,86%

11- Table 11: Consumption of energy in the society

How do you think is overall energy consumption of today's society?	
Little	0,57%
Low	0,57%
Right	2,69%
High	40,74%
Excessive	55,45%

Table 12: Your consumption compared to the society

In relation to the society in which they live, how would you rate the energy that you consume?	
Well below the average	0,57%

Below the average	14,85%
On the average	70,01%
Above Average	14,00%
Very above average	0,57%

12- Table 13: Knowledge about renewable energies

Indicate for each of them, whether or not renewable energy	YES	NO
Nuclear	12,45%	87,55%
Oil	1,98%	98,02%
Solar	97,60%	2,40%
Wind	98,59%	1,41%
Firewood	22,07%	77,93%
Geothermal	88,68%	11,32%

13- Table 14: Knowledge about nuclear consumption

What percentage of the energy consumed worldwide is nuclear?	
5%	10,61%
20%	44,55%
50%	34,51%
98%	10,33%

14- Table 15: Knowledge about energy in Navarra

Of the electricity produced in Navarra in 2014, what percentage generated the wind farms?	
5%	14,99%
20%	50,07%
50%	32,39%
98%	2,55%

15- Table 16: Knowledge about stand-by energy

What percentage of electricity consumption of a household because the appliances in stand-by?	
1%	6,79%
5%	26,03%
10%	41,73%
20%	25,46%

16- Table 17: 1000 Euros

If you were given 1000 Euros to invest in one of these options. What would you choose?	
Better computers for UPNA	10,04%
Promote youth associations	13,44%
Increase the manuals in the Library	7,36%
Promote the use of renewable energy	37,34%
Buy Microwave ovens for student use	15,70%
Buy containers to facilitate separation of waste in college	16,12%

17- Table 18: Means of transport

What means of transport used most often to come to college?	
Bicycle	7,50%
City bus (villavesa)	24,89%
Car	31,68%
Walking	28,29%
Car sharing	6,51%
Motorcycle	1,13%
Others	0,28%

18- Table 19: Shut down the standby

Do you worry about shutting down the standby electronics in your home?	
Always	18,25%
Sometimes	53,18%
Never	28,57%

Table 20: Shut down the lights

Do you worry about turning off the lights of your home when moving from one room to another?	
Always	77,09%
Sometimes	22,21%
Never	0,71%